Content, Context, Computing

Keys to the National Education Technology Plan

Annette Lamb and Larry Johnson

Beyond high-tech gadgets and iPad apps lies the simple connection among content, context, computing, and learning.

The teacher librarian plays a unique role in helping teachers and students apply technology in meaningful ways.

The U.S. Department of Education and Office of Educational Technology hope to transform American education through a renewed emphasis on real-world activities that promote student achievement and a passion for learning. The **National Education Technology Plan** (NETP) (www.ed.gov/technology/netp-2010) focuses on 21st century learning "powered by technology" (2010, p. 4).

While much of the plan reinforces the "data-centered" emphasis of the last decade, glimpses of hope can be found in a shift toward innovative approaches to teaching and learning.

The plan contains five *elements: learning*, assessment, teaching, productivity, and infrastructure. Let's explore aspects of the plan with implications for the school library program.

LEARNING

"All learners will have engaging and empowering learning experiences both in and outside of school that prepare them to be active, creative, knowledgeable, and ethical participants in our globally networked society."

When selecting online resources, look for materials that connect subject-area content with real-world experiences. For instance, the website **Your Life, Your Money** from PBS (www.pbs.org/your-life-your-money) provides quality learning resources that can be applied both inside and outside the school setting. Students view compelling real-life stories about young people facing economic challenges, develop financial literacy skills, and apply their knowledge to authentic situations.

It's easy to get overwhelmed by the thought of identifying new materials for every content area and grade level. Instead, focus your attention on the individual NETP action items listed under *each NETP goal.*

Action 1.4 - Use advances in the learning sciences and technology to enhance STEM (science, technology, engineering, and mathematics) learning and develop, adopt, and evaluate new methodologies with the potential to enable all learners to excel in STEM.

Help teachers explore new ways to express science content. The real-world data found on infographics such as **Quakes** (http://niceone.org/lab/quakes) can help bring scientific data alive for learners. Experiences such as **Prince William's Oily Mess: A Tale of Recovery** (http://oceanservice.noaa.gov/education/stories/oily-mess) provide real-world applications of science.

Figure 1. Quakes Infographic (niceone.org/lab/quakes

Let's explore how you can combine content, context, and computing to build a meaningful learning experience.

Content. The interactive tutorials at **Learn Genetics** (http://learn.genetics.utah.edu) are an engaging way to learn about how cells work.

Context. Once students have an understanding of cell *biology*, give the generic cell a face. Read the book **The Immortal Life of Henrietta Lacks** by Rebecca Skloot, watch **Hela Cell** (http://youtu.be/0gF8bCE4wqA) on YouTube, and explore **Henrietta Lacks (HeLa)** (http://web.me.com/portagekix) website. Examine the **Henrietta Everlasting** timeline (http://wired.com/magazine/2010/01/st_henrietta) visualizing the impact of the HeLa cell lines and read the 1976 article **The Miracle of Hela** (http://tinyurl.com/ebony-hela).

Computing. Ask students to transfer their knowledge of cell biology and medical research to a new situation. What other people have been used for medical research without their knowledge? Use online resources for background information about medical ethics and issues in medical research. Then, ask students to create a video about their findings and post it on **Vimeo** (http://vimeo.com).

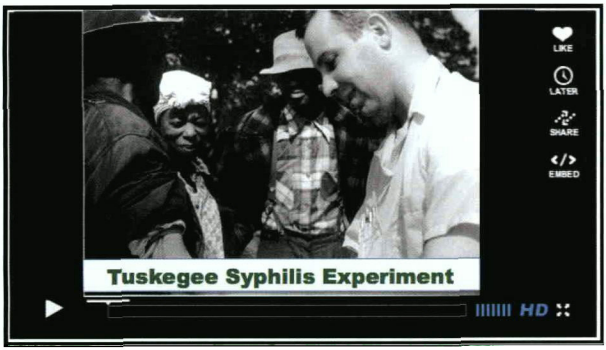

Figure 2. Tuskegee Syphilis Experiment video.

Providing students meaningful examples and engaging ways to share their understanding is an important part of designing an effective learning environment. According to NETP (2010), "it brings state-of-the art technology into learning to enable, motivate, and inspire all students... to provide personalized learning."

What if we could motivate students and personalize learning? It's possible through projects such as **Admongo.gov** (http://admongo.gov/ad-library.aspx) that don't just provide students with one example, but encourages students to explore and evaluate an entire advertisement library based on their interests.

ASSESSMENT

Our education system at all levels will leverage the power of technology to measure what matters and use assessment data for continuous improvement.

Traditional multiple-choice tests fail to measure the multi-dimensional aspects of learning necessary for continuous improvement. Teacher librarians can help classroom teachers use a variety of technologies to understand how the whole child is learning.

After reading a book such as **Enemy Pie** by Derek Munson, children may be asked to share an experience associated with what they learned in the book. Rather than a traditional writing assessment, student responses are recorded orally using **VoiceThread** (http://voicethread.com/?#u1007547.b1273106.i6840079).

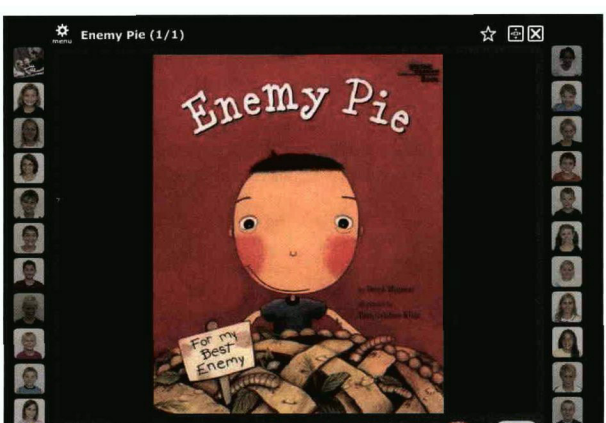

Figure 3. Enemy Pie experiences in VoiceThread.

An NETP action item of particular relevance focuses on using gaming and simulation technology in teaching and learning.

Action 2.3 - Conduct research and development that explore how gaming technology, simulations, collaboration environments, and virtual worlds can be used in assessments to engage and motivate learners and to assess complex skills and performances embedded in standards.

Biologist E. O. Wilson and computer game designer Will Wright were interviewed as part of a 2009 National Public Radio program focusing on gaming. Wilson stated, "I think games are the future in education. We're going through a rapid transition now. We're about to leave print and textbooks behind." Wright described taking visits through virtual worlds to different ecosystems.

Projects by groups such as the Federation of American Scientists are producing games such as **Immune Attack** (http://fas.org/immuneattack) to help students understand molecular biology. Some of these games like **Routes: Discover the Secrets in Your Genes** (http://routesgame.com/) combine documentary films, games, and social media.

Beyond using the games themselves, involve students in activities that connect to 21st century skills such as content evaluation and analysis. For instance, students may be asked to evaluate a game they play at the **Nobel Prize** (http://nobelprize.org/educational) website.

- Is the game effective at conveying the concepts?
- Does it oversimplify the topic?
- Does the scenario reflect a real-world situation?
- What could be changed to make the game more effective?

Students capture and label screens as part of their critique. Evaluating the game involves students in deep thinking regarding the content.

Use images, audio, and video throughout the assessment process. Involve stu-

BOOKMARKIT

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YA NONFICTION

AS THE WORLD TURNS...

India (Countries Around the World). Ali Brownlie Bojang. Heinemann, 2012. 978-1-4329-5207-5. $33.00. Grades 5-8. Heinemann opens this new series with twenty-four titles, featuring the geography, culture, and more with charts, fact boxes, colorful pictures, and reader-friendly text. A timeline, glossary, websites, and index are included.

Nigeria (Enchantment of the World. Second Series). Ann Heinrichs. Children's Press, 2010. 978-0-531-20653-9. $28.88. Grades 5-10. Rich photos and clear text divided into chapters consisting of the government, arts, sports, and daily living tells the story of life in Nigeria. The addition of appealing sidebars and maps makes this a solid source of information. Fast Facts, "find out more," and an index round out the title. Amazon has the price at $29.00

Singapore (Cultures of the World). Lesley Layton. Marshall Cavendish Benchmark, 3rd ed., 2012. 978-1-60870-787-4 print. $40.48. Ebook available. Grades 6-12. The highly applauded series is presenting its third edition which introduces new information as well as extensive back matter, such as fact pages about the economy, culture, and time line. The concluding material also has a glossary, further reading, and a detailed index. Amazon has the price at $47.07

We Visit Afghanistan (Your Land and My Land—the Middle East). Tamra Orr. Mitchell Lane, 2011. 978-1-58415-959-9. $33.95. Ebook available. Grades 4-8. This new series takes readers to Afghanistan, Iran, Iraq, Turkey, Israel, Pakistan, Kuwait, Oman, Yemen, and Saudi Arabia. Each book contains color photos, map, facts, crafts, and a local recipe—for example, Afghani Hummus. Chapter notes will be helpful to the student, as well as the additional information section, glossary, and index.

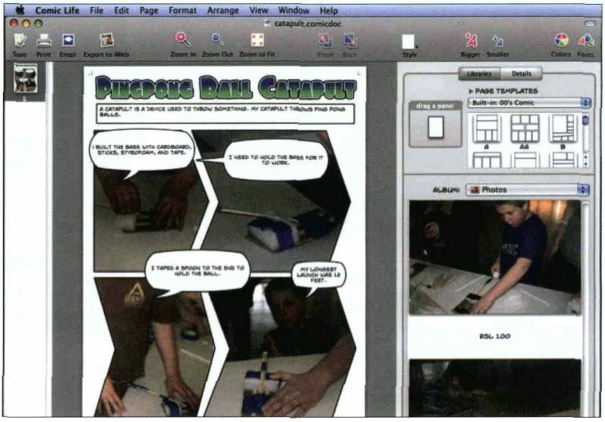


Figure 4. Ping Pong Catapult project using Comic Life.

dents in sharing their understandings using tools such as journaling, photography, screen captures, and video recordings.

Let's explore an example of how technology can help students convey their knowledge and skills in a non-traditional way.

Content. Rather than learning from a textbook, use graphic representations such as HowToons (http://howtoons.com) comics to talk about the angles and energy or the formation of bubbles.

Context. Build your own science project and photograph the process. Use the images to share understandings of the process.

Computing. Use the software Comic Life (http://plasq.com/education) to write about the process.

According to the NETP (2010), "21st century learning requires new and better ways to measure what matters, diagnose strengths and weaknesses in the course of learning when there is still time to improve student performance... measure 21st century competencies and expertise – critical thinking, complex problem solving, collaboration, and multimedia communication – in all content areas."

What if we focused on critical and creative thinking in the assessment process? Websites such as **Switcheroo Zoo** (http://switchzoo.com/) and **BuildYourWildSelf** (http://buildyourwildself.com) ask students to apply knowledge and make decisions related to animal adaptation in a fun and interesting way.

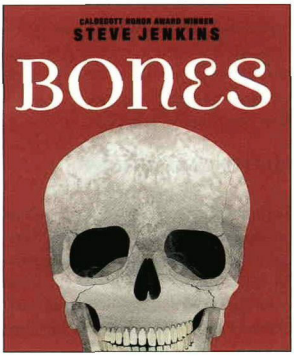
TEACHING

Professional educators will be supported individually and in teams by technology that connects them to data, content, resources, expertise, and learning experiences that enable and inspire more effective teaching for all learners.

The teacher librarian plays an important role in connecting educators to quality materials for professional development. Increasingly, national organizations like the American Association for the Advancement of Science are providing access to resources such as **Science Update** podcasts (http://scienceupdate.com/podcasts) and ***Science NetLinks Facebook*** updates (http://facebook.com/pages/Science-NetLinks/122822963502) to make teachers aware of trends and resources in science education.

Action 3.4 - Use technology to provide access to the most effective teaching and learning resources, especially where they are not otherwise available, and to provide more options for all learners at all levels.

Many classroom teachers aren't comfortable using online materials in lesson preparation. Rather than overwhelming



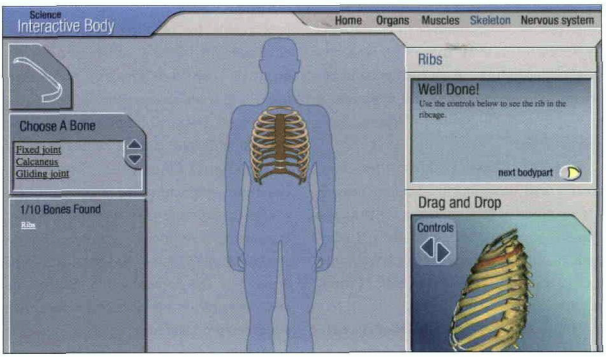


Figure 5a, b. Bones by Steve Jenkins and Interactive Body from BBC Science.

them with websites, begin with a science standard related to body systems and a book such as **Bones** by Steve Jenkins. Then, demonstrate how the **Thinkfinity** (http://thinkfinity.org) website can be used to locate lesson plans and learning games like **Interactive Body** (http://www.bbc.co.uk/science/humanbody/body) from BBC.

Match professional development opportunities and online resources for teachers with learning communities in your school.

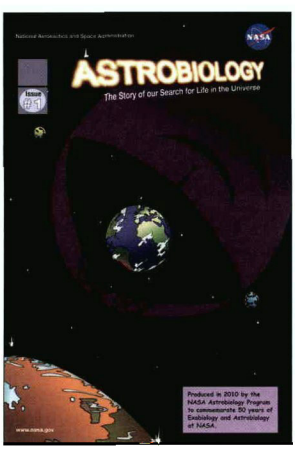
Content. Working with social studies and science teachers, use the **Professional Development** (http://loc.gov/teachers/professionaldevelopment) resources from Library of Congress related to using primary source materials in the classroom.

Context. Show teachers the **Inventive Wright Brothers** (http://loc.gov/teachers/classroommaterials/primarysourcesets/flight) materials and brainstorm ideas for an assignment using **Google Patents** (http://google.com/patents) to explore inventions created locally or within the state.

Computing. Involve students in tracing the history of an invention. At the same time, encourage teachers to apply their new skills in using primary sources in the classroom. How does the invention reflect the times? Use software an online tool for creating timelines such as **Timeglider** (http://timeglider.com) or **TimeRime** (http://timerime.com).

The NETP challenges educators to use 21st century resources for professional development, "... teams of connected educators replace solo practitioners and classrooms are fully connected to provide educators with 24/7 access to data and analytic tools as well as to resources that help them act on the insights the data provide."

What if educators worked together to create learning experiences? Each teacher could do what he or she does best. Resources like **Edutopia** (http://edutopia.org) provide lots of examples and an online community to share ideas.



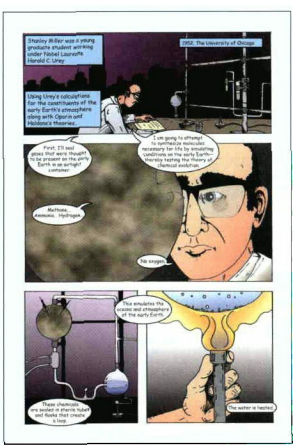


Figure 6a,b. Astrobiology graphic novel-style e-book from NASA.

INFRASTRUCTURE

All students and educators will have access to a comprehensive infrastructure for learning when and where they need it.

Today's school library must provide access to resources beyond the school day. Creating a virtual presence for the library will become increasingly important. For instance, the library website may provide access to interactive websites that motivate readers such as **Where Did the River Go?** (http://www.whereditdtherivergo.co.uk/storybook) or the online graphic novel-style e-book from NASA, **Astrobiology** (http://astrobiology.nasa.gov/articles/astrobiology-graphic-novel).

Action 4.3 - Leverage open educational resources to promote innovative and creative opportunities for all learners and accelerate the development and adoption of new open technology-based learning tools and courses.

Museums, libraries, universities, nonprofits, and government agencies provide a wide range of free resources for students. Explore materials developed by museums such as **UK Museums** (http://www.show.me.uk) and **The Tate Movie Project** (http://www.tatemovie.co.uk/studio).

NASA is a government agency well-known for their free, quality materials.

Content. NASA e-Clips (http://www.nasa.gov/nasaeclips) are short instructional videos with matching inquiry-based lessons.

Context. Space provides a real-world context for exploring concepts related to many disciplines including health, wellness, and physical education.

Computing. Young people use electronic spreadsheets provided in the NASA teacher guides to explore concepts and test out ideas such as "How does the human body react differently in space."

Students need access to always-on learning resources. The NETP states "... a comprehensive infrastructure for learning that provides every student, educator, and level of our education system with the resources they need when and where they are needed."

What if everyone had anytime, anywhere access to learning? The **Internet Archive** (http://archive.org) provides open source resources including moving images, live music, audio, and texts. It's just one of many resources that the school library can highlight for student use 24/7.

PRODUCTIVITY

Our education system at all levels will redesign processes and structures to take advantage of the power of technology to improve learning outcomes while making more efficient use of time, money, and staff.

From blogs and wikis to content management systems, an array of online tools is available for building virtual learning environments. Online collaborative writing tools such as **Wikispaces for Educators** (http://wikispaces.com/site/for/teachers) provide a way for teachers and students to build and share content cooperatively.

Mr. Chase's Government Class (http://chaseusgovernment.wikispaces.com) uses a wiki to structure class activities. Rather than using a textbook, activities and assessments apply real-world resources. Students take the authentic U.S. Citizenship and Immigration Services test rather than a teacher-produced test.

Action 5.4 - Rethink basic assumptions in our education system that inhibit leveraging technology to improve learning, starting with our current practice of organizing student and educator learning around seat time instead of the demonstration of competencies.

Work with teachers to rethink traditional curriculum pacing. Online learning options can go beyond the traditional school day. The teacher librarian can provide leadership in locating and designing virtual materials to support this new way of learning. The school library can become a hub for small groups working on virtual assignments.

Content. Use of online resources such as infographics for learning such as **How Laws are Made** (http://www.mikewirthart.com/wp-content/uploads/2010/05/howlawsmadeWIRTH2.jpg).

Context. Use the **Battlefront: Campaigners on a Mission** (www.battlefront.co.uk/) website as a place to find real-world needs and consider where laws need to be made.

Computing. Use the **Thomas** (http://thomas.gov/) website to make contacts, track real bills, and share findings.

The NETP challenges educators to rethink basic assumptions by stating; "we must leverage technology to plan, manage, monitor, and report spending to provide decision-makers with a reliable, accurate, and complete view of the financial performance of our education system at all levels."

What if we used real-world resources and assignments? Rather than purchasing expensive textbooks, consider the wealth of government-sponsored, non-profit, and organizational resources around the world including **USA.gov** (http://www.usa.gov). How much money could be saved?

PUT IT ALL TOGETHER

The National Education Technology Plan provides an opportunity for teacher librarians to connect with educators throughout the school. From classroom teachers and technology coordinators to support staff and principals, everyone will be impacted as this plan is implemented.

In the article "Can Your School Meet the Goals of the National Education Technology Plan?," Willona Sloan (2011) describes the U.S. Department of Education's goals as "lofty, exciting, and well-intentioned, but the NETP seems less like a plan and more like a wish list for cash-strapped schools that are struggling to support the technology programs they already have, to provide access to kids stuck on the wrong side of the digital divide, and to create more efficient schools by using fewer resources."

Teacher librarians can demonstrate practical ways to use existing resources as well as designing low-cost, high-impact solutions to technology challenges. Sloan (2011) states "while it is fair to say that the young people are using technology, it's not accurate to say they are all using technology at a high level to perform complex tasks". *Work with teachers to create* projects that model the effective use of technology by combining a wide range of resources and tools. Rather than starting with a new unit, consider ways to update traditional units with innovative resources and approaches.

For instance, students have been reading **The Diary of Anne Frank** for decades. However the new visual book titled **Anne Frank: The Anne Frank House Authorized Graphic Biography** (http://us.macmillan.com/annefrank-2) by Sid Jacobson and Ernie Colon provides a different way to experience Anne's life. When you combine this with the **Anne Frank Official Website** (http://www.annefrank.org), **YouTube Channel** (http://youtube.com/annefrank),

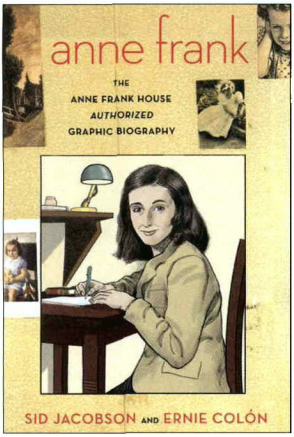


Figure 1. Anne Frank: The Anne Frank House Authorized Graphic Biography

Virtual Exploration (http://www.annefrank.org/en/Subsites/Home/), and PBS Masterpiece Theatre (http://www.pbs.org/wgbh/masterpiece/annefrank), students and teachers have a variety of opportunities to understanding content-area knowledge related to the time period through the context of the life of Anne Frank.

Finally, technology can be used to help students create their projects. In this case, involve students in connecting another time period to young people. For instance, the Children's Museum of Indianapolis program titled **The Power of Children" Making a Difference** (http://childrensmuseum.org/themuseum/powerofchildren) also examines the life of Ruby Bridges and Ryan White.

CONCLUSION

Countries around the world are exploring ways to effectively integrate technology into teaching and learning. Canada's provinces have each developed plans for 21st century learning. John Kershaw (2010), New Brunswick's Deputy Minister of Education, states "students deserve to have access to the tools of their generation in the classroom." Their plan focuses on "producing creative problem solvers, being relevant to our students and using their time wisely."

Around the world, educators are exploring ways that learning can be powered by technology. However, that's just the beginning. What really matters is how educators, government, business, and others collaborate to make it happen. The teacher librarian and school library can serve as hub for these technology-enhanced learning experiences.

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Adapted from ***Context, Context and Computing: Rediscovering the Beauty of Learning*** *by Annette Lamb (http://educapes.com/sessions/context).*

WEB SITES

TOPIC: OIL

FOR EDUCATORS:

Adventures in Energy http://www.adventuresinenergy.org/What-are-Oil-and-Natural-Gas. What are oil and natural gas? Explanation includes interactive graphs and imbedded videos and covers a range of topics: how petroleum is formed, exploration and production, refining, transporting.

Students' Guide to Oil Spills http://www.waado.org/NigerDelta/Essays/Pollution/StudentsGuide.html. Created by Oil Spill Intelligence Report in Massachusetts, the site provides a concise summary of how much oil is spilled every year, as well as why, how, and what happens afterwards.

EIA Energy Kids – Oil http://205.254.135.24/kids/. The U.S. Energy Information Administration gives an overview of how oil is formed, where it is found, and an explanation of offshore drilling. Site includes clear graphs, visual depictions, and photographs. Side bar links to games and activities, including science fair experiments on energy. From home page, select "Energy Sources," then "Oil."

American Experience: The Alaska Pipeline http://www.pbs.org/wgbh/amex/pipeline. PBS examines the history of the Alaska Pipeline and how it affects people and the environment. The site has information about the film, including the transcript, teacher resources, and articles. Special features allow students to try their hand at virtual welding and pumping, and test themselves on pipeline safety.

Centre for Energy: Energy Drives Canada, Energy BOT Squad http://www.centreforenergy.com/Education/EnergyDrivesCanada. Explore the "Energy BOT Squad": ten robots representing different sources of energy. Each robot takes the reader to fast facts, teacher resources, and videos. From the Canadian Centre for Energy Information, the site includes extensive teacher resources on petroleum, petroleum products, and energy conservation.